

# THE USE OF ELECTRONIC MONEY AND ITS IMPACT ON MONETARY POLICY

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## Abstract

*E-money is the newest payment instrument. As a part of the new electronic payment system (possible future substitute of traditional payment), e-money raises the professional interest about its implications to further development of banking functions in the global and networked economy. Statistical evidence confirms the existence of e-money in the developed countries, which is understandable because of their high technological level and knowledge and the ability to absorb useful innovations of any kind. But, although electronic money has been present in their markets for more than 20 years, its use is still at a very low level. Countries from the region<sup>2</sup> are in the early beginning. They are in the phase of accepting electronic banking, and putting into force the legislation for e-money. The reason could be found in the level of economic and technological development. One of the leading factors opposing the existence of e-money is the strong competition from the debit/credit cards. The possible influence of e-money on the monetary policy is also a topic of professional interest overall. E-money has the potential to substitute currency in circulation, which is part of the monetary aggregates from the balance sheet of central banks. Now, the influence is not significant - central banks are recording very low decrease of currency in circulation as a result of increase of e-money. But still, having in mind that any innovation takes time to be accepted on the market, in the future central banks and experts need to follow the developments surrounding e-money more closely and more carefully.*

**Keywords:** e-money, European countries, countries of region, monetary statistic, monetary policy

**JEL Classification:** E51, E52, E58, E61, F69

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## Introduction<sup>3</sup>

The technological progress contributes to development of a new direction in the payments system, called the electronic payments system. This new system refers to all transactions which are conducted electronically. It is clear that the development of the electronic payment

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system is connected with the advancement of information technologies and the development of global economy characteristic. The process is not linear and uniform. Many factors have influenced the new electronic system features: level of development of one country, its openness to global market and integration of different markets of money and commodities, a country's capability of accepting new challenges that come with the technology, and lately, the importance of educational level of one country has been more often emphasized. The reality is that the traditional banking is changing and countries are facing challenges to accept new banking practices, such as electronic banking.

Electronic money or E-money was introduced as a payment instrument more than 20 years ago. The dynamics of the use of e-money was much slower than expected in the beginning, primarily as a result of the expensive implementation, while at a later stage the introduction of complex regulations for an electronic money institution played an inhibitive role. That is why in this paper (after the definition of e-money, the analysis of e-money as an instrument and its introduction to the market) the main focal point is the process of regulation needed for new system implementation. There are beneficial experiences of the countries of the Euro-zone and also the countries from the region which help each country to discover and investigate new challenges in the domain of using e-money and implementation of new ways of banking. Having in mind that the digital era is yet to come, e-money will bring many discussions and issues in the near future.

On the other hand, the presence of e-money gives rise to many debates about its influence on monetary policy, through its ability to replace the currency in circulation. So far its influence has been insignificant. In order to develop an objective approach to the analysis of future interconnections between these processes, this paper analyzes the influence of e-money on the monetary policy of central banks.

## Definition of e-money

E-money is the newest instrument in the payment system, and according to one broader definition this is the money that is transferred electronically. But still, the definition of e-money is more complex and more precise, and it is a problem "to describe a dynamic phenomenon within a comparatively static framework".<sup>4</sup> According to the European directive, *e-money presents a monetary value, as represented by a claim on the issuer, which is stored on an electronic device, issued upon receipt of funds in an amount not less in value than the monetary value issued and accepted as a means of payment by undertaking other than the issuer*.<sup>5</sup>

E-money is not printed money or a deposit. Payments are limited only to the sum which is stored on the electronic device. One of the main differences with the other payment instruments is that the issuer and the recipient of e-money are different, while in the case of other payment instruments they are the same (for example banks can issue credit cards and at the same time accept payments with such cards). An issuer of electronic money can be a bank (if it has a special permission to carry out this activity) or a special electronic

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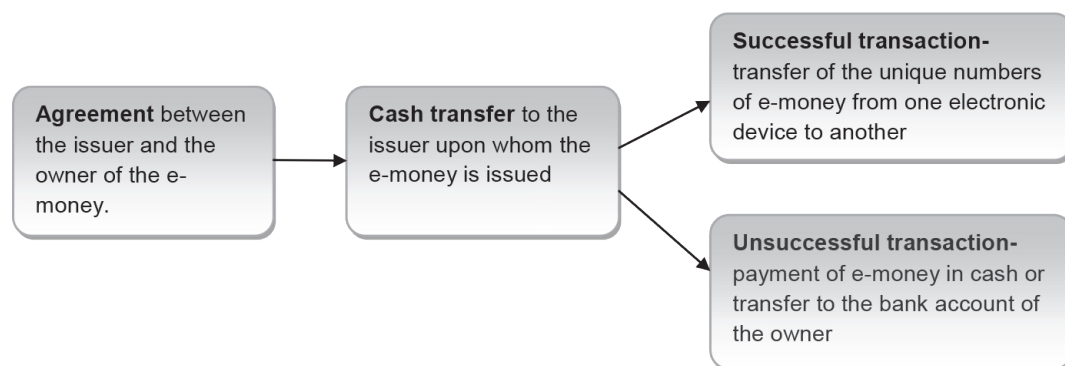
4 Robert Guttman(2002) *Cybercash: The Coming Era of Electronic Money* Palgrave Macmillan p.p. 9

5 DIRECTIVE 2009/110/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC

money institution which is any legal person authorized to do so by a supervisor. Electronic money has the following specific characteristics too<sup>6</sup>:

- *Lower transaction costs* in comparison with other payment instruments. One of the reasons is that the institution does not need to keep cash in their ATMs, and the costs are lower because there are less data to be exchanged comparing with other payment instruments.
- *Higher fixed costs* in comparison with other payment instruments, as a result of using the inevitable modern IT. Modern technology must be permanently renewed and upgraded with the latest technological innovations. This feature of the technology is rooted in the major breakthroughs in implementing e-money in the developed countries.
- *E-money has no value* if not used for a transaction, while the other payment instruments can be used as a banking deposit.
- *E-money is less transparent*, while credit cards have the name and the number of the holder, for example.
- *E-money can substitute the currency in circulation*, but so far this influence has been very low.

The process of transaction with e-money is different from the process of other payment instruments, regarding the specific characteristics of the e-money.



The highest number of transactions is registered in the developed countries, which have the largest share in globalization of the financial system. Nowadays e-money is most often used for small payments, among retailers or in the virtual world. These two areas in which e-money is most often used actually define the two basic types of e-money: hardware and software e-money.

### Hardware e-money

Hardware e-money is card-based e-money, mostly used by retailers. In most of the cases it is used for small payments or for one type of payment. It can be divided according to the purpose, for example e-money cards for parking payments, for transportation; according to the location they are used at-only in the university area, in the sport centers; or according to the technology they use-those that can be passed through a reader or those which are readable without contact. Most popular e-money cards are Dumont, Mondex, Proton etc. One of the advantages of this

<sup>6</sup> ECB (2000), Issues arising from the emergence of electronic money, Monthly Bulletin, November

e-money card is that it does not have a large sum of money, and there are no data about the owner.

In first place, transactions with e-money cards are very similar to the credit or debit cards, but still there are differences between them. In the two cases, the user needs to transfer cash in order to use the e-money card or the credit/debit card. Also, these two types of cards can be used globally, using the internet connection. On the other hand, the e-money card is not connected with a bank account (as the credit/debit card) but with the sum on the electronic device. Also, with the e-card there are no possibilities for debt and the transaction is only to the sum which is on the electronic device. Electronic money is neither deposit, nor credits, so it cannot bring any interest to the owner.

### *Software e-money*

The transfer of electronic money is through a telecommunication network and the internet, while the money is stored on the server<sup>7</sup>. This type of e-money is not stored on the chip of the card, or on the computer, but on the central server at the issuer of the e-money. It is known as server based e-money or software e-money. Well-known examples are PayPal, DigiCash etc. The payment is through on-line models, and the transfer of money is by an online account (bank deposit accounts are not included). The user has access to his account by the internet explorer, email or by his cell phone. This type of e-money is most often offered on the market by nonbanking institutions. For example the money from the card is transferred on the PayPal account. There is no access to the financial data of the user. An advantage of using PayPal is that the user gets bonuses or points, lower provisions etc.

## **E-money legislation**

The first legislation for issuing of e-money was enacted in 2000, as a European directive for e-money. This directive gave the first definitions of e-money and its characteristics and the legislation for establishment and functioning of the institutions for e-money. The aim of the directive was to create a competition between the banking institutions and the e-money institutions, and at same time to stimulate further innovations in electronic industry. But, despite the established legislation for e-money, the development of this market was very weak and failed to match the initial expectations.

In developed countries there were small numbers of e-money institutions and insufficient interest for using e-money as a payments instrument. The analyses showed that the reasons for the initial failure of e-money were in the weaknesses of the EU directive. The definition of e-money was not complete. The definition only covered the e-money cards, but not the e-money stored on a server. Also, the new e-money institutions had limited activities and high initial capital, which was one of the reasons that the investors were not interested enough in participation on this new market. In addition to the weakness of the EU directive, e-money faced some other challenges, and that was repaid penetration of payment cards on the market, which were serious competition to the e-money.

The statistical data prove the above mentioned conclusions for the development of e-money

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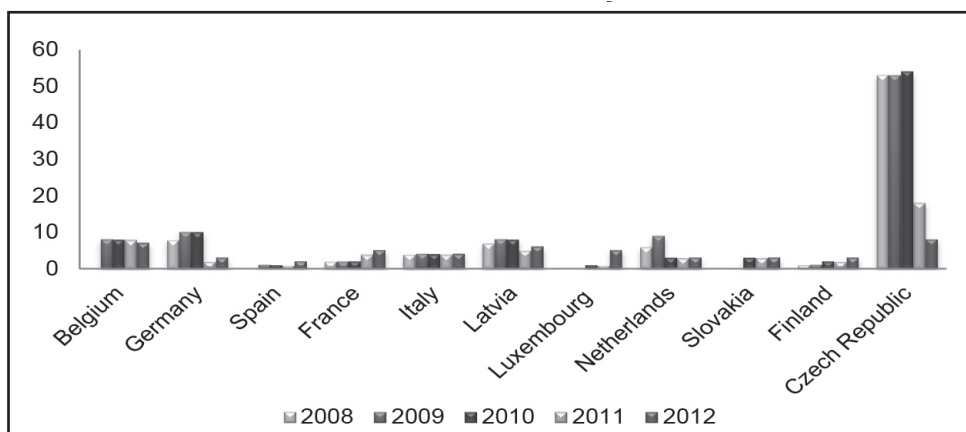
<sup>7</sup> Phoebus Athanassiou and Natalia Mas-Gui(2008) Electronic money institutions, current trends, regulatory issues and future prospects, legarl working paper, ECB, p.p 6-7

institutions and e-money as a payment instrument. The lack of initiative for establishing e-money institutions and at the same time the undeveloped system for stimulation of e-money transactions can be seen through the annual data of the European Central Bank for the payments system of European countries. The number of the established e-money institutions is from one to nine, with the exception of the Czech Republic, where higher number of institutions can be found (this high number is due to change of the legislation of e-money institutions, where every institution can perform these activities as long as it has permission from the supervision).

This situation proves that there was a need for change in the e-money legislation. The European commission published in 2009 the new E-money Directive<sup>8</sup>, which implemented the main objectives of the first directive. A new definition of e-money covered the two basic types of e-money: e-money cards and server e-money; the initial capital required for establishing an e-money institution was decreased from 1 million Euros to 350.000 Euros; it increased the number of activities that e-money institution can perform in order to stimulate the competition. Other changes that were introduced with the new Directive were aimed at allowing better access to new and safer services of the electronic market.

Most of the countries implemented the new E-money Directive till mid 2011. The experience of the countries was different. Each of the countries searched the most proper way to implement this directive according to their legal system. Some countries passed a new Law for e-money; some implemented this directive as part of their current Payment Systems Law (Czech Republic, Slovenia, and Bulgaria). Greece implemented the new legislation for e-money in their Banking Law.

Chart 1. Number of electronic money institutions



Source: ECB, payment statistics, august 2013

Macedonia implemented the new EU directive for e-money too, which was one of our obligations according to the Action plan for European partnership. The legislation for e-money and for establishing the e-money institution is part of our new Law on payment operations.<sup>9</sup> It

<sup>8</sup> DIRECTIVE 2009/110/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 September 2009, on taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

<sup>9</sup> Law on payment operations (2010), Official Gazette of the Republic of Macedonia No. 22/2008, 159/2008 и 133/2009, 145/2010, 35/2011 и 11/2012 145/10

regulates the conditions in which an institution can issue e-money and also the way it is done. E-money can be issued by banks which have a special permission from the National bank, or by specialized institutions for issuing e-money. The act also specifies the conditions for establishing these institutions, and provides the sections of the Banking Law which also regulate e-money. This act regulates the risk management of e-money institutions. The relationship between the issuer and the owner of e-money is regulated with the Macedonian obligation law.

So far, in Macedonia there has been no evidence of e-money transactions or special institutions for issuing e-money. This current situation highlights the constant need for analyzing the factors which influence the development and use of e-money.

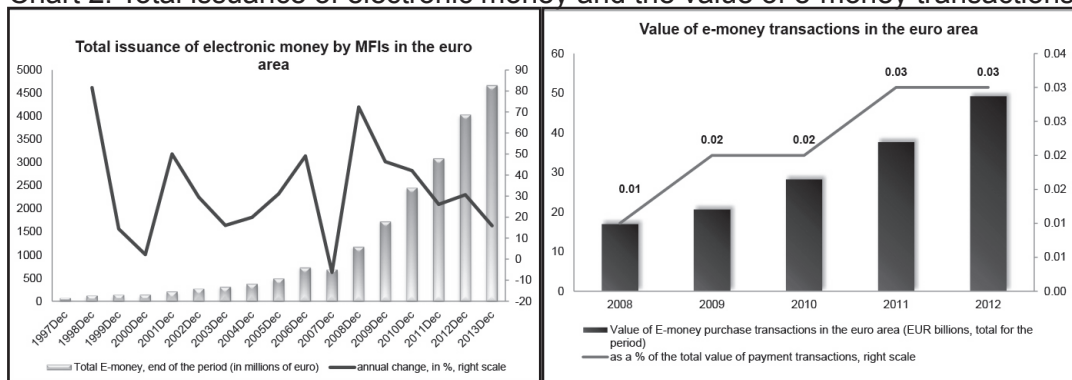
## Use of e-money in the European countries and in the countries from the region

E-money is going to become a part of modern banking. Some of the factors that influence its development have a global character (the new information communication technologies, internet), and all others depend on the conditions developed in one country. The factors on the national level are: the level of development of the country (influencing the purchasing power and people's standard of living), the absorption power for accepting technological innovations, market developments, the regulatory system, the degree of integration in the global economic and financial markets. Therefore, it is realistic to expect that the transactions in e-money have been registered in the developed countries first, such as countries in the European Union. In the countries from the region, electronic banking is still in its early phase and it has not been accepted yet by the people and institutions.

### *E-money in the European countries*

According to statistical data of ECB, the use of e-money based on cards started in 1998, while the use of server e-money, ten years later. The total e-money in circulation had the highest increase in the period 2008-2011.

Chart 2. Total issuance of electronic money and the value of e-money transactions

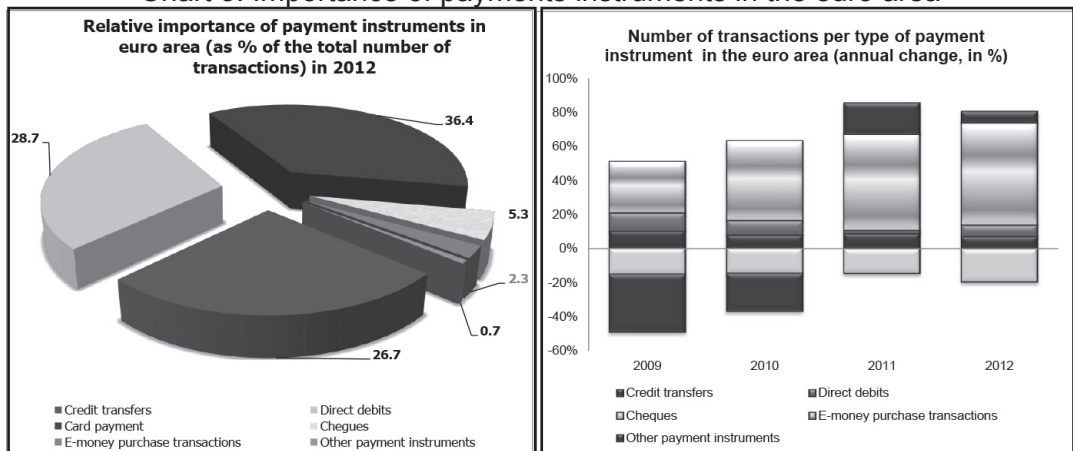


Source: ECB, payment statistics

The comparison with other instruments of the payment system in the European countries gives a very clear picture. For example, transactions with debit/credit card account for around 40% of the total payments transactions in comparison with transactions in e-money which are very low. The share of the number of transactions in e-money in the total number of transaction of the payment system in Euro area was only 2, 33% in 2012. A comparison with previous years indicates a slight improvement (1, 35% in 2008 and 1, 70% in 2010)<sup>10</sup>.

According to the statistical data provided by ECB for each of the European countries, the highest annual increase of e-money transactions was registered in 2008. This annual change is mostly due to transactions in Luxemburg, especially to server e-money transactions. One of the most powerful electronic companies "PayPal" moved its headquarters in the middle of 2007 from Great Britain to Luxemburg, and at the same time they expanded their license for e-money. With the new license, access to PayPal can be gained through all internet pages, despite the past, when it could have been done only through the internet pages in Great Britain.

Chart 3. Importance of payments instruments in the euro area



Source: ECB, payment statistics

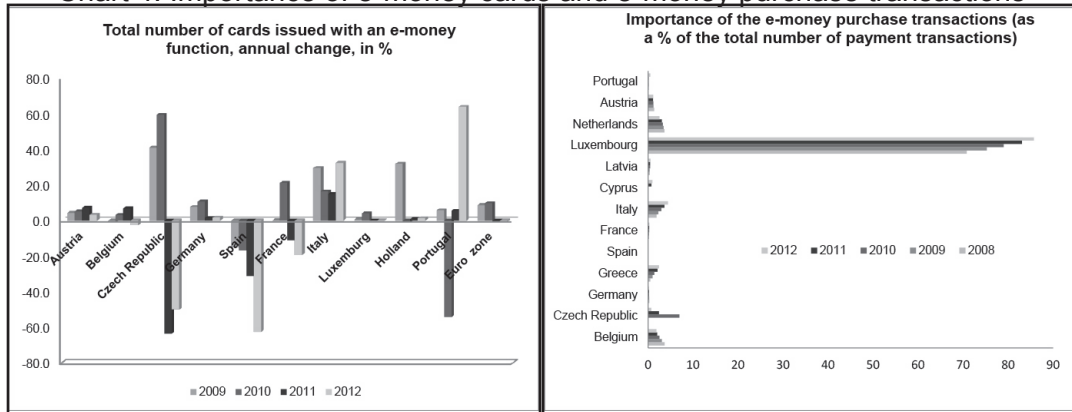
The analysis shows that the highest number of e-money transactions was registered in Luxemburg, Holland, Italy, Belgium, Czech Republic and Germany. Still, the method in which the transactions were conducted was different. High number of issued e-money cards was registered in the Netherlands, Germany, Belgium and France. Luxemburg was the leading country by e-money transactions, but the number of e-money cards was very small, which means that the transactions were mostly done through the server. In the last years, almost 80% of the total number of payment transactions in Luxemburg has been done through e-money purchase transactions, while in the other European countries it is between 0,01-3%. Luxemburg was the leading country according to the value of e-money purchase transactions, which in 2012 was 34,8 billion Euros. In the second place was Italy, with 12,7 billion Euros<sup>11</sup>.

<sup>10</sup> ECB, Payment Statistics, annual data, data as of August 2013

<sup>11</sup> Payment statistics, ECB, august 2013



Chart 4. Importance of e-money cards and e-money purchase transactions



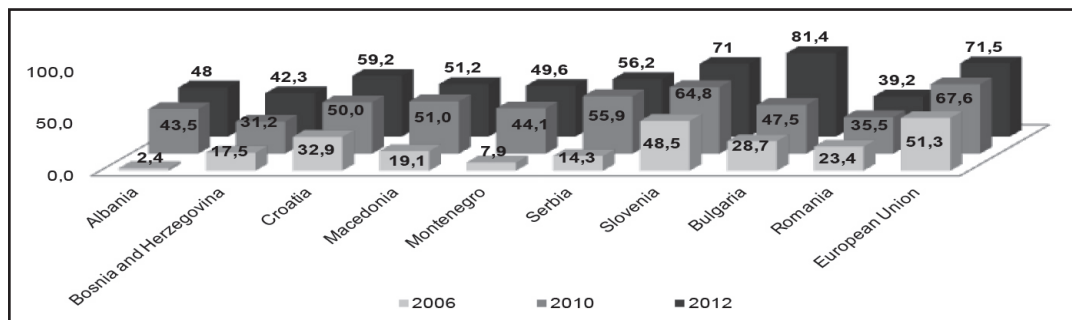
Source: ECB

In spite of the initial enthusiasm for massive use of e-money, it becomes clear that the competition with the debit/credit cards was much stronger than expected. The great number of payment transactions in the European countries is due to credit cards mostly because of their easy use. People need more time to accept the new digital money.

### *E-money in the country of the region*

In the countries of the region (including Macedonia), there have been no data about e-money transactions so far. This process is in its very early stage, with initial efforts invested in establishing legislation and institutions for the use of e-money. Acceptance of electronic banking leads to building a network for internet connection between banks and clients. There are many reasons for the delays in this process. We can mention only one: in the countries from the region massive use of internet started just 10 years ago in comparison with developed countries where it started 10 years before it! It reflects the existence of not only technological, but at the same time educational, institutional and economic gap between countries from the region and developed countries.

Chart 5. Internet users (as % of the total population in the country)

Source: [www.internetworldstats.com](http://www.internetworldstats.com)



In spite of the lack of data about e-money, the process of preparation for functioning of the e-money market has grown into an ongoing process. At the same time, electronic banking (even not e-money), is an early step to a new kind of payment system (the electronic payment system). Recently, Albania issued a piece of legislation for instruments for electronic payments, where electronic money is defined as a payment instrument, different from the rest, which can be loaded with monetary value each time when there is a need for that. The only issuers of e-money can be banks and branches of foreign banks. In the central bank of Albania there are data about internet banking, which means different banking services through internet, like paying bills, checking the account balance and etc. The foregoing notwithstanding, e-money is still not present in this country. In Serbia, electronic banking is primarily connected with electronic transactions between banks and their clients. So far, the development of electronic banking in this country has been of a slow pace, partly because of the level of internet connectivity. Around 30% of the households in Serbia used internet only for checking their e-mail or reviewing web pages, but not for certain banking services. In Croatia, e-money legislation was introduced in 2011. Since March 2011, PayPal has been used, and through this system users can receive e-money, not as before only to order and pay through PayPal. Today, any user who has e-mail account on PayPal can send money to another user.

## **E-money in the monetary statistics**

E-money is included in the monetary statistics - the data can be found in the ECB statistics. But, the specific characteristics of e-money make the scope of transactions with e-money and the records of used e-money questionable (for example the users which use PayPal make a direct contact with this system). So, there are challenges in the future for further development of monetary statistics.

The statistical record of e-money in European countries started in January 1996<sup>12</sup>. As we mentioned before, e-money is divided as software and hardware e-money. In the beginning, the monetary statistics of ECB only recorded hardware e-money, but since January 2003 software e-money has been recorded, too.

E-money is included in monetary balance sheet, according to EU regulation EC/25/2009 of the ECB, for the balance sheet of the monetary financial institutions (ECB/2008/32). The transactions with e-money are on the liabilities side, in the category overnight deposits, included in the transferable deposits, as part of monetary aggregates. The overnight deposits are balances which can immediately be converted into currency or used for cashless payments, and their transfer is not performed with any delay or certain limitations. Also, overnight deposit is included in the monetary aggregates and it is a subject of minimum reserve requirements.

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12 <http://www.ecb.int/stats/money/aggregates/emon/html/index.en.html>

Table 1. ECB definitions for monetary aggregates

|  | M1 | M2 | M3 |
|--|----|----|----|
| Currency in circulation                                  | X  | X  | X  |
| Overnight deposits                                       | X  | X  | X  |
| Deposits with agreed maturity of up to 2 years           |    | X  | X  |
| Deposits redeemable at a period of notice up to 3 months |    | X  | X  |
| Repurchase agreements                                    |    |    | X  |
| Money market fund  |    |    | X  |
| Debt securities up to 2 years                            |    |    | X  |

Source: ECB

According to this, e-money is included in the broad money supply. This kind of statistics is also recommended by IMF.

## Influence of e-money on monetary policy

E-money can replace currency in circulation. A possibility of its influence on the monetary policy is considered. But in this development phase of e-money, this kind of influence on monetary policy is not registered. Currency in circulation is a part of central bank's monetary aggregates and balance sheets. The low level of substitute of currency in circulation is proof for the most frequent conclusion for the small, negligible influence of the e-money.<sup>13</sup>

According to the Survey of developments in electronic money and internet and mobile payment (2004) BIS,<sup>14</sup> no central bank has registered influence on their balance sheet caused by reducing currency of circulation as a result of e-money. Also, there are no data registered for losing revenues. Although this survey was taken 10 years ago, the conclusions are still valid for the present development of e-money.

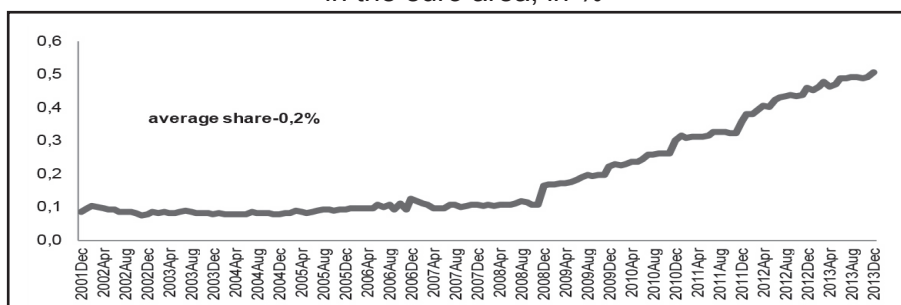
Broadly speaking, any innovation has its own life cycle. E-money is a new payment instrument on the electronic market – it is an innovation. Each of the innovations has its own path from birth to withdrawal from the market. The first and the second phase of their life cycle are followed by the phase of fast development and expansion in the market. There follows the phase with decreasing interest in this innovation, and the cycle is finished with the last phase when innovation leaves the market. For example, the first computer came to the market in 1975, but its massive use was registered 16 years later. Cell phones started to be used by the majority of population after 13 years from their first market entrance<sup>15</sup>. The dimension of each of the phases of e-money development cannot be predicted. But we know its life cycle started. That is why we can predict growing expansion of e-money in the future and expect a phase of massive and full use of e-money. With further market penetration of e-money, its influence on monetary policy will become greater. E-money is going to become a very useful payment instrument, so monetary policy of each country will have to face the consequences. Furthermore, monetary policy needs to develop a system of instruments which will be capable of controlling the growing use of e-money and integrate this coming trend into monetary policy fields of interest.

13 Reynolds Griffith (2004) Electronic Money and Monetary policy, Southwestern Economic Review, p.p 47

14 Survey of developments in electronic money and internet and mobile payment (2004), Committee on Payment and Settlement Systems, BIS, p.p.5 (95 central banks and monetary institutions were included, for period 2002-2003)

15 Barbara Good (1998) Will electronic money be adopted in the United States, working paper 9820, FRB of Cleveland. P.P 1, 28

Chart 6. Share of electronic money in circulation in currency of circulation in the euro area, in %



Source: ECB

The analysis of ECB shows possible implications of e-money over monetary policy:<sup>16</sup>

1. There is a need for keeping the role of money as a unit for economic transactions;
2. Wider use of e-money can influence functions of monetary instruments
3. E-money can influence the information conveyed from monetary indicators, with their only aim-price stability.

The danger from the high degree of substitute of currency in circulation with e-money is presented through the influence of decreasing central bank balance sheet, which means limitation of their positive influence on the monetary instruments. In order to avoid this negative influence in the near future, there is another possibility taken into consideration and that is the possibility for the central bank to impose reserve requirements on all issuers of electronic money.<sup>17</sup>

According to previous analyses, the impact of the emergence of electronic money on monetary policy can mostly be expected in the following areas:<sup>18</sup>

- a) *Decrease in the control of central bank over money supply.* Decreasing the central bank's control of money supply depends on the degree of substitution of currency in circulation with e-money. The currency in circulation is part of monetary aggregates, and if it is decreased as a result of wider use of e-money, it will produce difficulties in measurement of monetary aggregates and of the control of money supply by the central bank. Possible solutions for limitations of this effect are for example, limitations of the use of e-money. But this will be in direct confrontation with the laws of technological progress and could produce negative external effects on the banking in general. Because of that, there is a need for intensified research on new opportunities to limit the adverse impacts of replacing cash with electronic money.
- b) *Increase in the velocity of money.* The influence of e-money over monetary policy can be seen through monetary aggregates, the ability of the central bank to control money supply. In the future impact should be seen through indicators related to monetary aggregates, like the velocity of money. With the use of

<sup>16</sup> Issues arising from the emerging of electronic money(2000)Monthly Bulletin,ECB, p.p 54-56

<sup>17</sup> Reynolds Griffith (2004) Electronic Money and Monetary policy,Southwestern Economic Review, p.p 53

<sup>18</sup> Al Laham M, Abdallat N, Al Tarawneh H, (2009) Development of the electronic money and its impact on the central bank role and monetary policy, Issues in Informing Science and Information Technology, Volume 6

e-money, transactions are relatively cheaper which allows increase in the number of transactions, and increase in the speed of money. Generally speaking, it will be useful, but only to the level that the central bank could control or measure the monetary aggregates.

- c) *Volatility in exchange rates.* The change of the monetary multiplier is an important indicator. This indicator shows the share of currency in the money supply. As a result of e-money the currency decreases producing effects to multiplier.
- d) With the use of currency, the need for printing cash is decreasing, which influences the revenues of central banks.
- e) E-money has a characteristic of easy portability and affordability which offers a wide use in trade among countries. It is assumed that the user of e-money, motivated with the cheaper foreign currency transactions, will prefer the transactions to be in the most powerful currency. So, through PayPal and other services, users from the country with weaker currency will prefer to transfer their money in higher currency. So in this way the dollarization or euroisation will be a subject to clicking the mouse.<sup>19</sup> But still, this situation can weaken the central bank's control in the process of foreign currency exchange among the countries.

According to ECB, national banks can maintain the size of their balance sheets by imposing minimum requirements of the issuers of electronic money. There will be no change if the reserve requirement is impose on e-money because the currency will decrease for the same sum that e-money are increasing.

Still, all these analyses and facts about the influence of e-money on the monetary policy of the central bank will be part of future scenarios. Today, with the current use of e-money there is no room to worry on the part of central banks. Still, there is no broad willingness to accept e-money because of the expensive implementation, insufficiently developed supervision, need for broader statistics and also the danger from hackers.

*In the future, we could expect decrease of the currency, but it will be without larger effects or without reasons for any dramatic changes in the monetary policy.*

## Conclusion

Development of ICT and its revolutionary force to change every segment of modern life in a society and the global economy, results in substitution of old and now famous forms and instruments with new and now poorly researched ones in monetary domain. A good example is the gradual substitution of the traditional method of payment with an electronic payment system. One of the latest payment instruments is e-money, slowly building its path to its massive use. So far, the beginning of this path is evident in the developed countries, where the technological progress, as well as education and knowledge are at the highest level. In the developing countries, the electronic banking issues are will necessitate the enactment and enforcement of new e-money legislation.

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<sup>19</sup> Reynolds Griffith (2013) *Electronic money and monetary policy*, Stephen F.Austin State University, Southwestern Economic Proceedings, p.p.50.

On the other hand, the influence of e-money on monetary policy can be seen through its ability to substitute currency in circulation. So far, because of the small use of e-money, its influence on monetary policy is insignificant, which does not mean that will stay like that in the future. Having in mind that every innovation needs time for penetration in the market, we could expect that in future, e-money will be accepted as a regular payment instrument. Following this, its influence on monetary policy could be increased (it will depend on the extent to which it will substitute the currency in circulation). This means that developed countries and developing countries need to monitor the trend of development of e-money on the market and the increasing degree of use by institutions and clients. Furthermore, they need to develop capacity for managing the e-money driven economy. 30 years ago we could not imagine that the world would be opened before us just with the click on the mouse, so, with this experience we could expect that the world would be covered with e-money transactions in the future.

## References

Al-Laham, M., Al-Tarawneh, H. & Abdallat, N. (2009) Development of Electronic Money and Its Impact on the Central Bank Role and Monetary Policy, Issues in Informing Science and Information Technology Volume 6, 2009.

Arnove, M. & Bandiera, L. (2004) Monetary Policy, Monetary Areas and Financial Development with Electronic Money, IMF, working paper 04/122.

Association of E-money Institutions in the Netherlands (2002) Electronic Money and E-money Institutions, a position paper on regulation, definitions and the market.

Athanassiou, P. & Mas-Gui, N. (2008) Electronic money institutions, current trends, regulatory issues and future prospects, ECB, legal working paper No 7.

BIS (2004) Survey of developments in electronic money and internet and mobile payment.

Caplehorn, R. (2004) PayPal, fast, easy, secure online payments, presentation, ECB, Conference on "E-payments without frontiers".

Commission of the European communities (2008) Accompanying document to the proposal for a Directive of the European Parliament and of the Council amending Directive 2000/46/EC on the taking up, pursuit of and prudential supervision of the business of electronic money institutions, Impact assessment, Commission staff working document.

Council of the EU and Commission of the European communities (2000) Action Plan-An Information Society for All.

Croatian National (2010) Bank Law for e-money.

ECB (1998) Report on electronic money.

European Central Bank (2000) Issues arising from the emerging of electronic money, Monthly Bulletin, November 2000.

European Commission (2006) Review of the E-Money Directive 2000/46/EC, commission staff working document, SEC (2006) 1049.

European commission (2008) Electronic money: Commission proposes clear legal framework for innovative payment solutions, press releases, IP/08/1491.

European commission (2009) Directive 2009/110/EC on the taking up, pursuit and prudential supervision of the business of electronic money institutions.

Fujiki, H. & Tanaka, M. (2009) Demand for Currency, New Technology and the Adoption of Electronic Money: Evidence Using Individual Household Data, Bank of Japan, discussion Paper No. 2009-E-27.

Fullenkamp, C. & Nsouli, S. (2004) Six Puzzles in Electronic Money and Banking, IMF, working paper 04/19.

Good, B. (1998) Will electronic money is adopted in the United States, FRB of Cleveland, working paper 9820.

Gormez, Y. & Budd, C. (2003) Electronic Money Free Banking and Some Implications for Central Banking, Central bank of the Republic of Turkey.

Griffth, R. (2004) Electronic money and monetary policy, Stephen F. Austin State University.

HM treasury (2010) Lying of regulations to implement the new E-Money Directive, consultation document, October 2010.

Kokkola, T. (2010) The payment system, Payments, securities and derivatives, and the role of the euro system, ECB.

Official Gazette of the Republic of Macedonia (2007) Decision on the terms and manner of operating of e-money entities, No. 159/07.

Official Gazette of the Republic of Macedonia (2010) Law on payment operations, No. 145/10.

Radojevic, T. & Radovanovic, D. (2010) Implementation of the electronic banking in Serbia, international conference in Litvania.

Schmit, S. (2005) Will central banking survive electronic money? Bank of England, presentation.